

1        CLAIMS:

2            1.     A semiconductor processing method comprising:  
3                forming an antireflective material layer over a substrate;  
4                annealing at least a portion of the antireflective material layer at  
5                a temperature of greater than about 400° C;  
6                forming a layer of photoresist over the annealed antireflective  
7                material layer;  
8                patterning the layer of photoresist; and  
9                removing a portion of the antireflective material layer unmasked  
10              by the patterned layer of photoresist.

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12            2.     The method of claim 1 wherein the antireflective material  
13              layer comprises a stack of layers.

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15            3.     The method of claim 1 wherein the antireflective material  
16              layer consists of one substantially homogenous layer.

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18            4.     The method of claim 1 wherein the layer of photoresist is  
19              formed against the antireflective material layer.

1           5.     A semiconductor processing method comprising:  
2           forming an antireflective material layer over a substrate;  
3           annealing the antireflective material layer at a temperature of  
4           greater than about 400° C;

5           forming a layer of photoresist over the annealed antireflective  
6           material layer; and

7           exposing portions of the layer of photoresist to radiation waves,  
8           some of the radiation waves being attenuated by the antireflective  
9           material during the exposing.

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11           6.     The method of claim 5 wherein the attenuation comprises  
12           absorbing radiation waves with the antireflective coating.

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14           7.     The method of claim 5 wherein the layer of photoresist is  
15           formed against the antireflective material layer.

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17           8.     The method of claim 5 wherein the annealing temperature  
18           is greater than about 800° C.

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20           9.     The method of claim 5 further comprising exposing the  
21           antireflective material layer to a nitrogen-containing atmosphere during  
22           the annealing.

1           10. The method of claim 5 wherein the antireflective material  
2 layer comprises oxygen, nitrogen and silicon.

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4           11. The method of claim 5 wherein the antireflective material  
5 layer comprises from about 5% to about 37% (by atomic concentration)  
6 oxygen, from about 10% to about 35% (by atomic concentration)  
7 nitrogen, from about 50% to about 65% (by atomic concentration)  
8 silicon, and hydrogen.

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10          12. The method of claim 5 wherein the annealing temperature  
11 is from about 800° C to about 1050° C, and wherein the antireflective  
12 material layer comprises from about 5% to about 37% (by atomic  
13 concentration) oxygen, from about 10% to about 35% (by atomic  
14 concentration) nitrogen, from about 50% to about 65% (by atomic  
15 concentration) silicon, and hydrogen.

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17          13. A semiconductor processing method comprising;  
18 forming a solid antireflective material layer over a substrate;  
19 altering optical properties of the antireflective material layer;  
20 after altering the optical properties, forming a layer of photoresist  
21 over the antireflective material layer; and  
22 exposing portions of the layer of photoresist to radiation waves  
23 and absorbing some of the radiation waves with the antireflective  
24 material.

1           14. The method of claim 13 further comprising exposing the  
2 antireflective material layer to an atmosphere during the altering, the  
3 atmosphere comprising at least one of nitrogen and argon.

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5           15. The method of claim 13 wherein the optical properties  
6 which are altered include at least one of an "n" coefficient or a "k"  
7 coefficient.

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9           16. The method of claim 13 wherein the altering comprises  
10 annealing the antireflective material layer at a temperature greater than  
11 about 400° C.

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13           17. The method of claim 13 wherein the altering comprises  
14 annealing the antireflective material layer at a temperature greater than  
15 800° C.

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17           18. The method of claim 13 wherein the altering comprises  
18 annealing the antireflective material layer at a temperature of from  
19 about 800° C to about 1050° C, and wherein the antireflective material  
20 layer comprises from about 5% to about 37% (by atomic concentration)  
21 oxygen, from about 10% to about 35% (by atomic concentration)  
22 nitrogen and from about 50% to about 65% (by atomic concentration)  
23 silicon.  
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1 19. A semiconductor processing method comprising;  
2 chemical vapor depositing an antireflective material layer onto a  
3 semiconductive material substrate at a temperature of from about  
4 300° C to about 400° C;

5 annealing the solid antireflective material layer at a temperature  
6 of from about 800° C to about 900° C to alter at least one of an "n"  
7 coefficient or a "k" coefficient of the antireflective material layer;

8 forming a layer of photoresist over the annealed antireflective  
9 material layer;

10 exposing portions of the photoresist to radiation waves while  
11 leaving other portions of the photoresist unexposed and absorbing some  
12 of the radiation waves with the antireflective material; and

13 selectively removing either the exposed or unexposed portions of  
14 the photoresist while leaving the other of the exposed and unexposed  
15 portions over the substrate.

16  
17 20. The method of claim 19 wherein the antireflective material  
18 layer comprises oxygen, nitrogen and silicon.  
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21. The method of claim 19 wherein the antireflective material layer comprises from about 5% to about 37% (by atomic concentration) oxygen, from about 10% to about 35% (by atomic concentration) nitrogen, from about 50% to about 65% (by atomic concentration) silicon, and hydrogen.